

App. No. 10/500,781
Amendment dated May 20, 2008
Reply to Office Action mailed December 20, 2007

REMARKS

The Examiner has rejected Claim 1 as being anticipated by Kitahara et al. Claim 1 is presently amended to distinguish still more clearly from the prior art made of reference. In addition, new claims 69 and 70 have been added which are based on previously pending Claim 1, but add further limitations which distinguish even more clearly from the prior art made of record.

Claim 1 has been presently amended to still more clearly define the dimensions of the printhead. Whereas previously pending Claim 1 referred only to the length of the printhead, presently amended Claim 1 recites both a length and a width for the printhead. The current claim requires that the width extends in the substrate movement direction and the length extends perpendicular to the width. The claim further requires that the printhead's length is greater than its width. It will be seen that this limitation is neither taught nor suggested by Kitahara.

The claim recites two directions: the 'substrate movement direction' and the 'printhead direction'. The Examiner has identified direction D0 in Kitahara with the claimed 'substrate movement direction'. As to the 'printhead direction', the claim requires that this is orthogonal to the 'substrate movement direction'. The 'printhead direction' is further constrained by the limitation that the claimed rows of nozzles extend in the 'printhead direction'. In Kitahara the nozzle rows of the printheads extend in direction E0; in Kitahara direction E0 is orthogonal to D0, which is analogous to the 'substrate movement direction'. It is submitted that direction E0 is the only direction within Kitahara that fulfils both these criteria. Thus, E0 must be considered the only direction falling within the scope of the term 'printhead direction'.

Therefore, to anticipate the claim, the length of printer head 3 in Kitahara in the 'printhead direction' (E0) must be greater than the width of printer head 3 in the 'substrate movement direction' (D0). However, it is clear from Figure 4 that the printer head is clearly far larger in direction D0 than in direction E0 and for at least the reason that Kitahara does not disclose this limitation it does not anticipate Claim 1.

As is discussed at paragraphs [0007] and [0012] the aim of Kitahara is 'full-line printing'. This requires the maximum possible nozzle density in direction E0 by having several printheads printing the same color overlapping in this direction. As the head units in each color array overlap in direction E0 they must be spaced in direction D0, as they cannot occupy the same space. This is shown in detail in Figure

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5, where the length of the overlap δa in direction E0 and the spacing in direction D0 of neighboring head units 35a and 35b is shown. As the head units are overlapped in direction E0 and spaced in direction D0 the overall result is an array which is wider in direction E0 than direction D0.

Further, the complete printer head comprises several such arrays of one color. Each array of one color must extend across the entire width of the printer head so that it can print the whole width in one pass. The arrays together must be aligned in direction D0 so that they all cover the same width of the substrate. As the arrays of different colors cannot all occupy the same space, they must be staggered in direction D0. This further expands the width of the resulting printhead in direction D0, and therefore any printhead built according to the teaching of Kitahara capable of 'full-line printing' will have greater extent in D0 than E0. Further, any modification of Kitahara to become wider in direction E0 than D0 would not accomplish the goal of 'full-line printing' and therefore would violate the clear and consistent teaching of Kitahara. For at least this reason it is submitted that Claim 1 is patentable over Kitahara.

The Examiner's statement that the term 'orthogonal' is open to different interpretations is not understood and as it might avoid further disagreement over the interpretation of the claims it would be greatly appreciated if he could illustrate what different meanings he considers the term to have. It is of course understood that such a list could not be exhaustive, but it would seem he considers there is at least one alternative meaning that might be pertinent to the claims and it may expedite prosecution if the Applicant were made aware of such an interpretation.

The Examiner's suggestions that the representation of printer head 3 in Figure 1 may be considered relevant to a consideration of the dimensions or proportions of the printer head 3 cannot be sustained. One of ordinary skill in the art would appreciate that Figure 1 is a schematic involving little or no consideration for dimensions of the components, for example consider other elements represented as rectangles in the same manner as the printer head 3: clearly CPU 1 is not intended to be the shape or size shown in the figure and 'print image data' 29, is a non-physical entity. Clearly, Figure 1 is intended to represent the system as a whole, rather than faithfully depict the apparatus. Of more import is Figure 4, which shows a representation of the construction of the printer head 3.

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Claim 69 presents substantially the same limitations as previous Claim 1, and further recites that each printhead unit deposits a swathe of droplets on the substrate, this swathe extending in the substrate movement direction. Claim 69 includes the limitation that swathes deposited by adjacent printhead units are separated by a gap in the printhead direction – perpendicular to the substrate movement direction. It is clear that Kitahara does not disclose this limitation as the intention of the document is to provide a single-pass printer – in other words, a printer in which all swathes overlap. Therefore, not only does Kitahara not teach this limitation, the inclusion of this limitation in Kitahara would contradict the clear and consistent teaching of that document. For at least this reason, it is submitted that Claim 69 is patentable over Kitahara.

Claim 70 also presents substantially the same limitations as previous Claim 1, and includes the further limitation that nozzles in an array are disposed on a line parallel to said printhead direction. The claimed array is the combination of nozzle rows from different printhead units depositing the same fluid. Therefore, in order to anticipate the claim, there must be a disclosure of at least two nozzle rows printing the same color/depositing the same fluid with their nozzles lying on a single line. Looking to Figure 4 of Kitahara, head units printing the same color ink are arranged along oblique lines; for example, 35a, 35b, 35c, 35d, 35e and 35f all print black ink and are arranged along line LA. It will be appreciated that the word 'oblique' refers to an angle which is not a multiple of 90 degrees: this specifically excludes the claimed situation where the line must be a multiple of 90 degrees. Therefore, as the line on which the head units are disposed is oblique, the nozzles of two head units printing the same color cannot lie on a single line. Thus, for at least this reason, Kitahara does not disclose the invention of Claim 70. Moreover, no motivation is provided within the prior art to violate the clear and consistent teaching by Kitahara that the line on which head units are disposed is oblique and for at least this reason it is respectfully submitted that Claim 70 is non-obvious and therefore patentable.

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It is respectfully submitted that the remaining pending claims within the application are patentable at least by virtue of their dependency.

Respectfully submitted,

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